The NDVECC Bulletin

Navy Disease Vector Ecology and Control Centers

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Who Invited This Guy To The Party?

Well, add another to the growing list! The coast of Washington can now claim *Ochlerotatus togoi* as an official resident, albeit an unwelcomed one. *Ochelerotatus togoi* is the scientific name for a mosquito species that has recently become established in the State and joins several hundred other organisms on the State's invasive species list. A native of the temperate areas of the Pacific east coast of Asia, this mosquito was first discovered near Vancouver, B.C., as evidenced by an undated specimen in the Canadian National Collection that may have been collected as early as the mid 1940's. In 1980, a breeding population of the mosquito was found about 4 miles south of Anacortes, WA, ending speculation as to whether or not the foreigner would extend its range across the Canada – United States border. The mosquito can now be found in the western part of the Puget Sound region near the area surrounding the city of Bremerton, WA, with the probable range extending further south along the coast.

As a relatively recent invader, there is not much known of the biology of *Ochlerotatus togoi* in its new North American habitat. All of the breeding sites are recorded as rock pools located just above the tidal zone and therefore the range is essentially limited to coastal areas. However, in Japan, *Oc. togoi* is one of the most widely distributed mosquitoes and the larval/pupal stages are commonly collected from movable containers such as fire fighting water tanks, wooden buckets, flower pots, grave markers, garden irrigation tanks, burrow pits, ground pools, ditches, and gutters. Some authors on the subject state that there are actually two morphologically identical varieties of the same species that inhabit different ecological zones: one variety favoring inland, container breeding sites while a different variety breeds in water approaching the salinity of sea water. The salt-water variety has been implicated as a ravenous human biter, while the fresh water, container-breeding variety appears to shun a human blood meal. In any case, in its native range of Asia, the species is a natural vector of Japanese B encephalitis virus and several filarial nematodes.

How did *Oc. togoi* get here? Nobody knows for certain, but the accusing finger of blame points to ocean-going vessels traveling between Japan and the U.S. The ability of the larvae to develop in high salinity water has endowed *Oc. togoi* with a great amount of flexibility and adaptability in regards to colonizing new lands. Larvae of *Oc. togoi* have been found in the bilge water of ships in Japan, and it is possible that adults can even stow aboard a vessel to wait out a trip across the Pacific. This is nothing new or unusual, as mosquitoes such as *Aedes aegypti* and *Culex pipiens* owe their cosmopolitan distribution to having hitched rides with transoceanic cruises and developing close host specificity to humans.

This author has collected *Oc. togoi* on several occasions in light traps baited with carbon dioxide, and also with an oral aspirator at a location in Bremerton approximately two miles from the nearest tidal water source. So far, all data indicates that the mosquito is limited to the coastal areas, but inland areas are being planned for surveillance under a joint project between NDVECC and the U.S. Army Center for Health Promotion and Preventive Medicine in Fort Lewis, WA. One bit of bad news is that *Oc. togoi* is found commonly associated with *Oc. japonicus*, another Asian species. *Oclerotatus japonicus* has not only invaded the east coast of the U.S., but has reached the west coast also, as an established population has been recently confirmed in King County, WA (Seattle). This combination may create a "one-two punch" for health and pest control professionals along the coast of Washington. Who knows where the invasion will stop? Oregon? California?

LCDR David Florin
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[Anyone wishing to obtain further information on *Oc. togoi*, please feel free to contact the author at david.florin@ndvecc.navy.mil – The editor]

U.S. Navy West Nile Virus Surveillance 2000-2002

West Nile Virus (WNV) is a mosquito-vectored flavivirus in the Japanese encephalitis complex, which also includes St. Louis Encephalitis. Although this virus was first isolated in 1937 in the West Nile district of Uganda, outbreaks have occurred in recent years in Romania in 1997, Russia in

1999, and Israel in 2000. WNV was first detected in New York City in September 1999, causing 62 cases with seven deaths, mostly in people over 65 years old. The disease was first thought to be St. Louis Encephalitis, but was later confirmed by the Centers for Disease Control (CDC) as WNV during an analysis of dead exotic birds from the Bronx Zoo. Humans infected with WNV usually experience a mild flu-like illness, but can develop severe encephalitis which can be fatal. The virus spread throughout the Eastern Seaboard and into the Midwest in 2000 and 2001, causing an additional 21 and 66 cases, respectively. In 1999, the major mosquito vectors of this virus were thought to be the northern house mosquito, *Culex pipiens* (Figure 1), and *Aedes vexans,* a floodwater mosquito. Since 1999, WNV has been isolated from over 40 additional species of mosquitoes, including species that breed in artificial containers around the home such as *Aedes albopictus*, (Asian Tiger Mosquito) and the newly introduced species, *Ochlerotatus japonicus*. In the western United States, the western encephalitis mosquito, *Culex tarsalis* (Figure 2), is considered an important potential vector.

Figure 1. *Culex pipiens* female.

Figure 2. *Culex tarsalis* female.

Since WNV has spread outside of the Northeast, the need to survey mosquitoes and animals for potential infection has increased, so that the risk to humans can be assessed. Birds and animals do not spread WNV directly, but are reservoirs for the virus and could serve as early indicators of human disease, since they sometimes become infected before human cases appear. For the past two years, the CDC has provided funding for the Navy Environmental Health Center (NEHC) to survey for WNV on Navy and Marine Corps installations. The Navy Disease Vector Ecology and Control Center (NDVECC) Jacksonville responded to this initiative by performing vector threat assessments on bases within their area of responsibility and helping Preventive Medicine personnel establish training and education programs to monitor for the presence of WNV in mosquitoes and birds. Initial visits in 2000 focused on assessing vector surveillance programs on installations, surveying breeding sites for mosquitoes, and providing public education on the threat of WNV to base personnel. In 2001, specific bases were identified in the CDC-defined risk area that had the capability to support a surveillance program. Intensive larval and adult surveillance was conducted on these bases to identify appropriate locations for placing light traps and gravid mosquito traps (Figure 3). Vector threat assessments were expanded in 2002 to include several installations on the outer edges of known WNV occurrence. Also, a collaborative relationship was established with the U. S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) in Fort Meade, Maryland to provide testing of adult mosquitoes for WNV.

Historically, most adult surveillance has been performed using CDC-style or New Jersey style light traps, which do not effectively collect mosquitoes without an attractant and can collect other insects. Therefore, adult mosquito surveillance was conducted in 2001-2002 using the Reiter-Cummings Gravid Mosquito Trap (Figure 4). This type of trap attracts blood-fed adult female mosquitoes using a solution of rabbit chow in water that mimics a stagnant breeding pool where females like to lay eggs. The solution is held in a dark-colored plastic pan with a toolbox-sized container on top containing a fan motor and net, so that when female mosquitoes enter to lay eggs, they are sucked inside. The mosquitoes are extracted the next day, then are chilled in the freezer for a few minutes, sorted, identified, and placed into pools of one to 25 specimens. The pools are then placed into a styrofoam container with frozen gel packs and shipped to USACHPPM for testing. Results are normally reported by e-mail, but if a pool tests positive, USACHPPM will immediately contact the installation and report it to state within 24 hours. Besides WNV, mosquitoes are also being tested for Eastern Equine Encephalitis (EEE). To date, USACHPPM has tested over 7,800 pools containing over 59, 000 mosquitoes. Two positive pools were found on Army bases in 2001, but no WNV-infected mosquitoes have been found on Navy or Marine Corps installations so far. USACHPPM also tests blood from birds and horses, which can also be infected with WNV. In 2001, five horses from Army bases were found to be positive along with 34 birds. Most of the positive birds were collected from Army bases, but one was collected from Naval Air Station Atlanta, one from Naval Station Annapolis, and one from the Naval Observatory. Potential WNV reservoirs like birds and horses should be monitored by coordinating their testing with the local Army Veterinary Service. In some cases, human infection with vector-borne encephalitis can be predicted by several weeks if animals are tested early during an epidemic.

Figure 3. LT F. Stell conducts larval surveillance to help determine appropriate locations for Gravid Trap placement.

People who are more at risk for developing encephalitis from WNV infection include those with underdeveloped or compromised immune systems such as young children and people over 55 years old. In the healthy active-duty population, most infections will be asymptomatic or present with mild fever, headache and body aches. Severe cases of WNV encephalitis are characterized by high fever, mental status changes, nausea, vomiting, or a flat, slightly raised rash and swollen lymph nodes. Treatment is supportive, and may include mechanical ventilation. The overall mortality rate is 3% to 15%, and patients who recover from WNV infection generally do not have any long-term complications. However, those who survive infection with EEE sometimes have permanent brain damage.

Figure 4. LT C. Doud and HM2 A. Phillips set a Reiter-Cummings Gravid Trap near a mosquito breeding site.

Since WNV is only transmitted by the bite of an infected mosquito, you should prevent yourself from being bitten by remaining indoors during the peak biting periods of dawn and dusk. Also, wear loose fitting shirts with long sleeves, long pants, and cover all exposed skin with an insect repellent containing no more than 35% DEET. Be careful applying DEET to areas around the face and eyes and use a repellent with a smaller percentage of DEET on young children. *Culex* and *Aedes* mosquitoes that transmit WNV breed in many different sources of water, and although it is difficult to remove all breeding sources, if you empty standing water in flower pots, birdbaths, and clogged gutters around the house, you can reduce the breeding of pest mosquitoes in your yard and may eliminate a potential WNV vector. If you have any questions about WNV or mosquito surveillance and control, please contact the Operations Department at NDVECC Jacksonville, commercial 904-542-2424, DSN 942-2424, ext. 3006/3014.

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WHY USE RAT GUARDS?

Rat guards play an important role in shipboard rodent control efforts. Effective control of rodent populations is extremely important as rodents can be vectors and/or reservoirs of several serious communicable diseases such as rabies, plague, murine typhus, leptospirosis, rat-bite fever, and food-borne illnesses such as salmonellosis. Rodents eat, contaminate, or destroy enormous amounts of food annually, and will also gnaw electrical insulation, which can result in electrical short-outs or fires.

The Norway rat, roof rat, and house mouse are particularly well suited for the specialized conditions found on board ships. These creatures can have enormous impact on the health and welfare of the ship's personnel, food supplies and morale. Rodents are excellent climbers, jumpers, and swimmers and can easily board a ship by climbing up the tending lines.

Rat guards were created to prevent entry of rodents onto ships via the tending lines and play a key role in rodent control efforts. Rat guards should have a 36-inch minimum outside diameter, a cone angle of 30 degrees, and be made of 18 gauge steel or aluminum. Rat guards must mounted with the point of the cone toward the ship on all tending lines, at least 6 feet from the pier and greater than 2 feet from the ship. Use rags to plug gaps and secure the rags tightly to prevent loosening or being pulled apart by the rat. Ensure stray lines are kept out of the water. If two lines are in close proximity to each other, either group the lines to pass through a single rat guard, or install the rat guards side-by-side or touching to prevent rats from jumping from one line to another, skirting the rat guards and making them ineffective.

Although international health regulations no longer require the use of rat guards by ships except when berthed in ports where plague is endemic, their use is still necessary, especially in ports where large rodent populations exist. Navy instructions vary, depending on the situation or locale. There may be instances when commanding officers or Medical Department personnel determine the use of rat guards to be advisable as an additional protective measure against rodent entry (SECNAVINST 6210.2A). For example, COMSUBLANT/ COMSUBPACINST 6000.2B requires rat guards for plague endemic areas, and recommends rat guards for all foreign ports. In contrast, CINCPACFLTINST 5440.3H requires rat guards on ***all*** lines in ***all*** ports.

As the best means of control is to prevent establishment of the problem, the use of rat guards in all ports will aid tremendously in preventing rodent entry and establishment of rodent problems on board ships. *Information from U.S. Navy Shipboard Pest Control Manual*

For additional information on rodent control:

SECNAVINST 6210.2A
BUMEDINST 6250.14
U.S. Navy Shipboard Pest Control Manual
Manual of Preventive Medicine, NAVMED P-5010, Chapter 8.

Featured Pest: Saw-Toothed Grain Beetle *Oryzaephilus surinamensis*

Saw-toothed grain beetles (Figure 1) are one of the preventive medicine technician's biggest challenges when dealing with stored food products. Found throughout the world, this active little beetle will infest cereals, dried fruits, pasta, chocolate, dried meats, drugs, sugar, breakfast foods, and even tobacco and snuff. It easily penetrates packaged foods and can make them unfit to eat.

Adults are small (~2.5 mm long), active brown beetles with flattened bodies well adapted for slipping into crevices. It is easily identifiable by the 6 saw-like projections found on each margin of its thorax. Females lay their eggs, either singly or in small batches, in crevices located in the food supply. Larvae molt 2-4 times before becoming adults. The life cycle from one generation to the next can take anywhere from 27 to 52 days, depending on the temperature. Adults can live for over three years.

Control measures involve careful inspection of all foodstuffs and ensuring that all food storage spaces are kept clean and free of any spilled food items. Spilled food and grain under and behind shelving and storage racks can become a source for infestations. Small quantities of infested food items can be treated by heating the product to 125°F for one hour or by freezing from 0°-5°F for 24 hours. Both heating and freezing methods will kill all life stages. Large quantities of infested food products however, will require either fumigation or disposal. Residual insecticides can be used for crack & crevice or spot treatments in empty storage areas to prevent infestation of new food products.

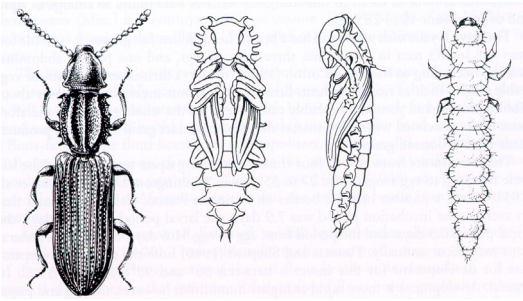

Figure 1. Saw-toothed grain beetle adult, pupa, and larva (Reprinted from Handbook of Pest Control, 1997).

From: Granovsky, T.A. Stored Products Pests. In: D. Moreland, editor. Handbook of Pest Control. 8th ed. Mallis Handbook & Technical Training Company; 1997. p 672-674.

Ribbon Cutting Remarks

[On 19 June 2002 the new building housing NDVECC, Bangor, WA was officially dedicated. Following is the text of the speech given by the OIC. –The Editor]

CAPT Breeden, CAPT Sack, CAPT Baker, CAPT Lofink, CAPT Hunter, CAPT Longstaff, CAPT Tueller, past OIC – CDR Mann, Honored guests, DVECC Staff, friends and family. I want to thank all of you for coming here today to celebrate the official dedication of the new home for the Navy Disease Vector Ecology and Control Center, Bangor, Washington. This is a very important event for us here at the Center and we are very pleased and excited about being here in this new facility onboard Subase, Bangor.

It has been a long process that has brought us here to this ribbon cutting ceremony from the time that the Center was first formed in 1957.

For those of you who are unfamiliar with what this center is, our mission simply stated is to maximize navy and marine corps team readiness through the surveillance and control of disease vectors and pests for the support of force health protection. And when I mention disease vectors I am speaking of organisms that are involved in some way with the transmission of disease to humans. We, like our sister Center in Jacksonville, are a collection of bug chasers and Preventive Medicine Technicians, with an Engineman, a corpsman, and 6 civilians thrown in.

The history of this center officially began in 1957 when the Navy Disease Vector Ecology and Control Center Alameda California was established as a sister unit to the DVECC in Jacksonville Florida. DVECC Jax was established in 1947 as Malaria Mosquito Control Unit number one. Both Centers can trace their roots to the malaria control efforts of WWII. Since that time, Entomologists and Preventive Medicine Technicians from these Centers have been sent to all major military actions. We have also been involved in many humanitarian assistance deployments and in numerous responses to natural disasters in the US and overseas. Added to this is an excellent education and training program in disease vector surveillance and control that has trained countless DoD Pest Management Professionals, Preventive Medicine Technicians and other Medical Department personnel.

The project that has led to the new facility that you see before you, has had a somewhat long history as well. Archeologists have uncovered documents dating back to 1981 that show DVECC Alameda, California as part of a combined MILCON with another BUMED project. This is the earliest known mention of a building project associated with DVECC, Alameda.

During the mid to late 1980s, other documents appear showing cost estimates and plans to demolish Building 130, DVECC Alameda's home, once a new building was completed. Before any construction could be started, however, NAS Alameda was placed on the BRAC list in 1993, and a search for a new home began. From 1993 to 1996, all of the administrative requirements were completed to move to a temporary facility in Poulsbo, Washington. On Friday, June 28, 1996, CDR Michael Mann, OIC, locked the doors of building 130 for the last time. DVECC, Bangor was opened and fully operational from the second floor of the Frontier bank on the following Monday. Plans were started to get the MILCON going here and in the fall of 2000, the contract was awarded to Trident Marine Construction Company and the new facility was begun.

There are countless individuals that have contributed to getting this facility to where it is today and to attempt to try and cover them all would guarantee that I would miss someone. But there are a few that I would like to take this opportunity to recognize. First and foremost is the staff, past and present, assigned to this Center. Without the hard work, dedication and professionalism of these individuals and the important mission they perform, there wouldn't be a need for this facility to be here. There are those on the design team represented today by Mr. Larry Seeley of the DLR Group who can conceptualize amazing things on paper. The staff at the Engineering Field Activity Northwest who were our neighbors since arriving from Alameda and then helped get us through the design, bidding and contract award process, as well as, project oversight. To Mr. Scott Nelson we give our sincere thanks. Scott started out as project director and ended up as the field engineer for the project as well. Many thanks to Trident Marine Construction Company represented by Mr. Robert Hymel, and of course, Mr. Doug Crummey. Doug was always here during the construction phase and was a pleasure to work with. We thank Trident Marine also for the refreshments that will be available inside after the ceremony. And, as this is a military construction project, we thank the Bangor personnel who have labored a lot with EFA and Trident Marine during the construction project, represented by Mr. William Galloway, LTJG Jennifer Avery, who started the project as the Resident Officer in Charge of Construction and turned that over to ENS Brian Foster who quickly got up to speed to see it through to completion. Finally, our sincere thanks go to LT Todd Gibson, who is amazing when it comes to outfitting a facility with furniture and equipment to meet even our rather unique needs. And to the ISSOT crew who went above and beyond the call of duty to get us moved over here to a facility that was ready to accept us.

CDR Jeff Corneil
OIC NDVECC Bangor

NDVECC Bangor's new home at SUBASE Bangor, Silverdale, WA.

FEATURED WEB SITE: *EXTOXNET*

This issue's featured website is the Extension Toxicology Network (EXTOXNET) site at url http://ace.orst.edu/info/extoxnet/. A collaboration between the University of California, Davis, Oregon State University, Michigan State University, Cornell University, and the University of Idaho, developed EXTOXNET to promote discussion on toxicology issues, provide information on toxicology issues, and facilitate the exchange of toxicology-related information. EXTOXNET provides information on pesticide toxicology and environmental chemistry. The web site allows for discussion of toxicological issues; toxicology newsletters; other resources for toxicology information; toxicology fact sheets; Pesticide Information Profiles (PIPs); and Toxicology Information Briefs (TIBs). In addition, EXTOXNET provides closed mailing groups for EXTOXNET participants to facilitate communication and responses to requests for information. If you're looking for good information on pesticides or other toxicology issues, check this site out!

NDVECC Jacksonville Training Course Schedule CY03

COURSE	NUMBER	DATES
DOD CORE PHASE	B-322-1070	MAR 03-10
CDP 800X		SEP 0 8-15
DOD PHASE II	B-322-1071	MAR 11-14
CDP 800W		SEP 16-19
DOD PHASE III	B-322-1072	MAR 17-26
CDP 800V		SEP 22 - OCT 1

NDVECC Bangor Training Course Schedule CY03

COURSE	NUMBER	DATES
Pest Mgt. For Reservists & PMTs	B-322-1050	JUN 16 – 27
DOD CORE PHASE	B-322-1070	SEP 8-15
DOD PHASE II	B-322-1071	SEP 16-19
DOD PEST MGT Recert.	B-322-1074	FEB 4-6
		MAY 9-11*
		DEC 2-4
Shipboard Pest Management	B-322-1075	FEB 12
		MAR 12
		JUN 11
		AUG 27
		OCT 15**
		DEC 10
Operational Entomology	B-322-1077	SEP 8-19***

*NEHC Conference San Diego
**Ingleside, TX
***Okinawa, Japan

We hope you have enjoyed reading our first issue of the NDVECC Bulletin and that you have found it informational. Any suggestions, comments or ideas for future issues should be directed to the editor at mail@ndvecc.navy.mil.

The views expressed in this newsletter are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the U.S. Government.